WHAT IS CLAIMED IS:

1. A switching apparatus comprising:

a substrate;

a movable portion which has both ends fixed on said substrate and is operated in relation to said substrate;

a switching electrode which is electrically insulated from said movable portion and provided on said movable portion; and

a gap electrode which is provided opposed to said switching electrode, and electrically conducts when said switching electrode comes into contact with the gap electrode with the operation of said movable portion,

wherein said movable portion comprises:

a piezoelectric element;

a first electrode provided on the substrate side of said piezoelectric element;

a third electrode which is provided on the substrate side of said piezoelectric element and is electrically insulated from said first electrode;

a second electrode provided on the opposite side to the substrate side of said piezoelectric element so as to be opposed to said first electrode;

a fourth electrode which is provided on the opposite side to the substrate side of said piezoelectric element so as to be opposed to said third electrode and which is electrically

insulated from said second electrode; and

a voltage applying unit is provided, which applies voltages to at least any one of said first electrode and said second electrode, and at least any one of said third electrode and said fourth electrode.

2. The switching apparatus according to Claim 1, wherein a direction of an electric field generated in the piezoelectric element between the first electrode and the second electrode by the voltages applied by the voltage applying unit is different from that generated between the third electrode and the fourth electrode.

3. The switching apparatus according to Claim 1, wherein a relationship between a direction of an electric field and a direction of polarization in a first portion of the piezoelectric element located between the first electrode and the second electrode is different from a relationship between a direction of an electric field and a direction of polarization in a second portion of the piezoelectric element located between the third electrode and the fourth electrode.

4. The switching apparatus according to Claim 1, wherein the substrate includes a fixing portion and a step portion, the both ends of the movable portion are fixed onto

said fixing portion, and said movable portion operates on said step portion.

5. The switching apparatus according to claim 1, wherein the switching electrode is formed so as to stride over the second electrode and the fourth electrode on the top of the movable portion.

6. The switching apparatus according to claim 1, wherein the voltage applied between the first electrode and the second electrode is different from the voltage applied between the third electrode and the fourth electrode.

7. The switching apparatus according to claim 1, wherein the shape of the switching electrode during operation of the movable portion is, in its portion opposed to the gap electrode, convex toward the gap electrode.

8. The switching apparatus according to Claim 7, wherein the convex shape of the contact portion of the switching electrode with the gap electrode is more approximate to a flat shape than the convex shape of the non-contact portion of the switching electrode with the gap electrode.

9. A switching apparatus comprising:

a substrate;

a movable portion which has both ends fixed on said substrate and can operate in relation to said substrate;

a switching electrode which is electrically insulated from said movable portion and provided on said movable portion; and

a gap electrode which is provided opposed to said switching electrode and electrically conducts when said switching electrode comes into contact with the gap electrode with the operation of said movable portion,

wherein said movable portion comprises:

a piezoelectric element;

first, third and fifth electrodes which are provided on the substrate side of said piezoelectric element and electrically insulated from one another;

second, fourth and sixth electrodes which are respectively opposed to said first, third and fifth electrodes with the substrate between on the opposite side to the substrate side of said piezoelectric element, and electrically insulated from one another; and

a voltage applying unit is provided, which applies voltages to at least either said first electrode or said second electrode, at least either said third electrode or said fourth electrode, and either any one of said fifth electrode or said sixth electrode.

10. The switching apparatus according to claim 9, wherein a direction of an electric field generated in the piezoelectric element between the first electrode and the second electrode and between the fifth electrode and the sixth electrode by the voltage applied by the voltage applying unit is different from that generated between the third electrode and the fourth electrode.

11. The switching apparatus according to Claim 10, wherein a direction of a stress generated in the piezoelectric element between the first electrode and the second electrode and between the fifth electrode and the sixth electrode by the voltage applied by the voltage applying unit is different from that generated between the third electrode and the fourth electrode.

12. The switching apparatus according to Claim 11, wherein the substrate includes a fixing portion and a step portion, both ends of the movable portion are fixed onto said fixing portion, and said movable portion operates on said step portion.

13. The switching apparatus according to claim 9, wherein the switching electrode is formed on the fourth

electrode on the top of the movable portion.

14. The switching apparatus according to claim 9, wherein the voltage applied between the first electrode and the second electrode, the voltage applied between the third electrode and the fourth electrode, and the voltage applied between the fifth electrode and the sixth electrode are different from one another.

15. The switching apparatus according to Claim 14, wherein the voltage applied between the first electrode and the second electrode is the same as the voltage applied between the fifth electrode and the sixth electrode.

16. The switching apparatus according to Claims 9, wherein the shape of the switching electrode during operating of the movable portion is, in its portion opposed to the gap electrode, convex toward the gap electrode.

17. The switching apparatus according to Claim 16, wherein the convex shape of the contact portion of the switching electrode with the gap electrode is more approximate to a flat shape than the convex shape of the non-contact portion of the switching electrode with the gap electrode.

18. The switching apparatus according to claim 9, wherein the first electrode is formed near a first end of both ends of the movable portion, the fifth electrode is formed near a second end on the opposite side to said first end, and the third electrode is formed near a central portion of said movable portion.

19. An electric field applying method in that, in a switching apparatus having a first electrode pair provided with a piezoelectric element between, and a second electrode pair provided adjacently to said first electrode pair in a state where the second electrode pair is electrically insulated from said first electrode pair, the method comprising the steps of:

generating an electric field in a first direction between said first electrode pair; and

generating simultaneously an electric field in a second direction between said second electrode pair.

20. The electric field applying method according to claim 19, wherein the potential difference produced between said first electrode pair is nearly equal to the potential difference produced between said second electrode pair.

21. The electric field applying method according to either of Claim 19, wherein by a common power source, the

potential difference is produced between said first electrode pair and between said second electrode pair.

22. A switching apparatus using a piezoelectric element, characterized in that:

plural electrode pairs for applying electric fields to said piezoelectric element are included; and

the electric fields in the plural electrode pairs are applied to said piezoelectric element so that the directions of the electric fields are nearly opposite to each other between the adjacent electrode pairs.

23. The switching apparatus according to claim 22, wherein said piezoelectric element is formed by a thin film process.

24. The switching apparatus according to either claim 22, wherein said piezoelectric element is formed on an MgO substrate.

25. The switching apparatus according to either claim 22, wherein said piezoelectric element is formed on a silicon substrate.

26. A switching system using a piezoelectric element,

comprising:

a piezoelectric element;

plural electrode pairs for applying electric fields to this piezoelectric element;

an electric wiring for supplying electric power to these electrode pairs, an electrode pair for electrically connecting an antenna and a high-frequency circuit for transmission and reception; and

a coupler for matching said piezoelectric element to said high-frequency circuit,

wherein the electric fields in the plural electrode pairs are applied to said piezoelectric element so that the directions of the electric fields are nearly opposite to each other between the adjacent electrode pairs.

27. The switching system according to Claim 26, characterized by being packaged by a high-frequency shielding material.

28. The switching system according to Claim 27, wherein said high-frequency shielding material is composed of glass or fused silica.

29. A switching apparatus using a piezoelectric element, comprising:

a piezoelectric element;

a first movable portion including the piezoelectric element;

a pair of second movable portions which couple to the first movable portion and include the piezoelectric element;

plural electrode pairs for applying electric fields to said first movable portion and said second movable portion; and

an electric field applying unit which applies electric fields so that the directions of the electric fields are nearly opposite to each other between the adjacent electrode pairs of said plural electrode pairs.

30. The switching apparatus according to Claim 29, wherein said first movable portion is coupled to the second movable portion in the largest displacement portion of said second movable portion.

31. A switching system using a piezoelectric element, comprising:

a piezoelectric element;

a first movable portion including the piezoelectric element;

a second movable portion provided around said first movable portion and including the piezoelectric element;

plural electrode pairs for applying electric fields to

said first movable portion and said second movable portion;

an electric wiring for supplying electric power to these electrode pairs;

an electrode pair for electrically connecting an antenna and a high-frequency circuit for transmission and reception; and

a coupler for matching said piezoelectric element to said high-frequency circuit,

wherein the electric fields in the plural electrode pairs are applied to said piezoelectric element so that the directions of the electric fields are nearly opposite to each other between the adjacent electrode pairs.